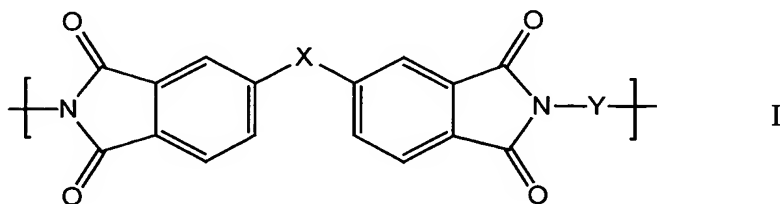


CLAIMS

What is claimed is:

1. A polyimide based composition comprising a polyimide component and an organic solvent, the polyimide component being represented by formula I



wherein X is O, S(O)<sub>2</sub>, C(CF<sub>3</sub>)<sub>2</sub>, or a mixture of two or three of O, S(O)<sub>2</sub>, and C(CF<sub>3</sub>)<sub>2</sub>;

wherein Y is diamine component selected from the group consisting of m-phenylenediamine (MPD), 3,4'-diaminodiphenyl ether (3,4'-ODA), 4,4'-diamino-2,2'-bis(trifluoromethyl)biphenyl (TFMB), 3,3'-diaminodiphenyl sulfone (3,3'-DDS), bis-(4-(4-aminophenoxy)phenyl sulfone (BAPS) or 9,9-bis(4-aminophenyl) fluorene (FDA);

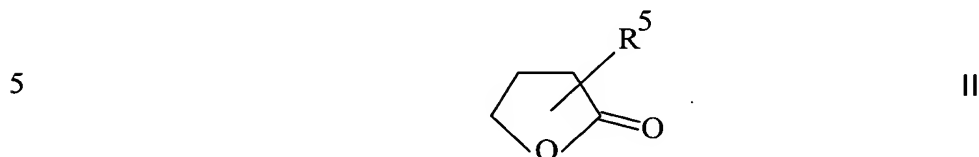
with the proviso that:

- i. if X is O, then Y is not m-phenylenediamine (MPD), bis-(4-(4-aminophenoxy)phenyl sulfone (BAPS) and 3,4'-diaminodiphenyl ether (3,4'-ODA);
- ii. if X is S(O)<sub>2</sub>, then Y is not 3,3'-diaminodiphenyl sulfone (3,3'-DDS);
- iii. if X is C(CF<sub>3</sub>)<sub>2</sub>, then Y is not m-phenylenediamine (MPD), bis-(4-(4-aminophenoxy)phenyl sulfone (BAPS), 9,9-bis(4-aminophenyl) fluorene (FDA), and 3,3'-diaminodiphenyl sulfone (3,3'-DDS);

wherein the organic solvent:

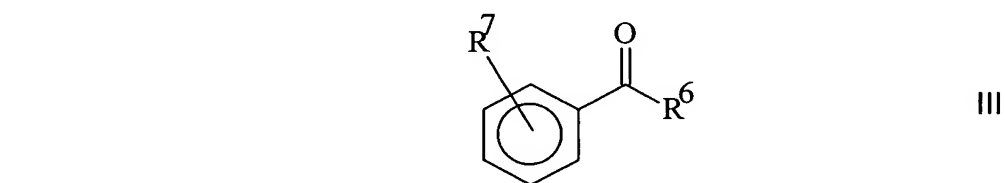
- i. is a liquid capable of suspending or dissolving the polyimide,
- ii. has a Hansen polar solubility parameter between and including any two of the following numbers 2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, and 10.0; and
- iii. has a normal boiling point between and including any two of the following numbers 180, 190, 200, 210, 220, 230, 240 and 250°C.

2. A composition in accordance with Claim 1, wherein the organic solvent comprises a liquid represented by formula II



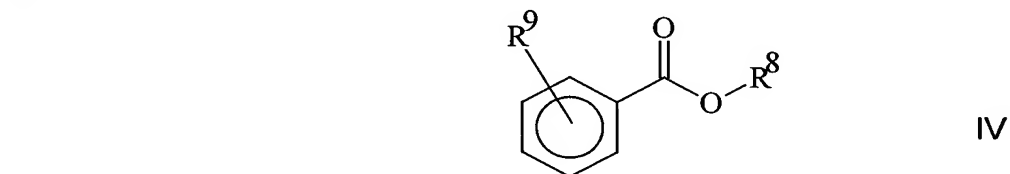
and wherein R<sup>5</sup> is H, CH<sub>3</sub>, or CH<sub>3</sub>CH<sub>2</sub>.

10 3. A composition in accordance with Claim 1, wherein the organic solvent is a liquid represented by formula III



and wherein R<sup>6</sup> is H, CH<sub>3</sub>, CH<sub>3</sub>CH<sub>2</sub>, or OCH<sub>3</sub> and wherein R<sup>7</sup> is H, CH<sub>3</sub>, or CH<sub>3</sub>CH<sub>2</sub>.

20 4. A composition in accordance with Claim 1, wherein the organic solvent is a liquid represented by formula IV



and wherein R<sup>8</sup> is CH<sub>3</sub>, or CH<sub>3</sub>CH<sub>2</sub> and wherein R<sup>9</sup> is H, CH<sub>3</sub>, or CH<sub>3</sub>CH<sub>2</sub>.

5. A composition in accordance with Claim 1, wherein the organic solvent is selected from the group consisting of 2-phenoxyethanol and tetrahydrofurfural acetate.

30 6. A composition according to Claim 1 wherein the polyimide component is present in the composition at a weight ratio of A:B wherein A is the polyimide component and B is the sum of the polyimide component and the organic solvent, and wherein A is between, and including, any two of the following numbers 0.05, 0.06, 0.07, 0.08, 0.09, 0.10, 0.15, 0.20,  
35 0.40, 0.60, 1.0, 2.0, 3.0, 4.0, and 5.0 and B is 100.

7. A composition according to Claim 6 wherein A is between, and including, any of the two following numbers 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30 and B is 100.

8. A composition according to Claim 1 wherein from 0 to 30 mole percent of the diamine component is selected from the group consisting of 3,3'-dihydroxy-4,4'-diaminobiphenyl (HAB), 2,4-diaminophenol, 2,3-diaminophenol, 3,3'-diamino-4,4'-dihydroxy-biphenyl, and 2,2'-bis(3-amino-4-hydroxyphenyl) hexafluoropropane.

9. A composition according to Claim 1 further comprising a thermal crosslinking agent selected from the group consisting of bisphenol epoxy resin, an epoxidized copolymer of phenol and aromatic hydrocarbon, a polymer derived from epichlorohydrin and phenol formaldehyde, and 1,1,1-tris(p-hydroxyphenyl)ethane triglycidyl ether.

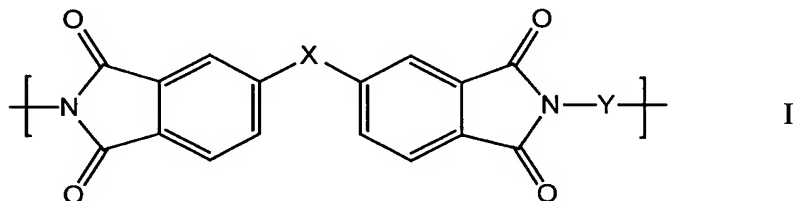
10. A composition according to Claim 1 further comprising a blocked isocyanate.

11. A composition according to Claim 1 further comprising a metal adhesion agent selected from group consisting of polyhydroxyphenylether (PKHH), polybenzimidazole, polyetherimide, and polyamideimide.

12. A composition according to Claim 1 further comprising a metal or metal oxide.

13. A composition according to Claim 12 wherein the metal or metal oxide is pretreated with a silane or titanate agent.

14. A polyimide useful as a component to make a polyimide solution, the polyimide solution being useful to make electronic circuit packages, wherein the polyimide is represented by formula I



wherein X is O, S(O)<sub>2</sub>, C(CF<sub>3</sub>)<sub>2</sub>, or a mixture of two or three of O, S(O)<sub>2</sub>, and C(CF<sub>3</sub>)<sub>2</sub>;

wherein Y is diamine component selected from the group consisting of m-phenylenediamine (MPD), 3,4'-diaminodiphenyl ether (3,4'-ODA), 4,4'-diamino-2,2'-bis(trifluoromethyl)biphenyl (TFMB), 3,3'-

diaminodiphenyl sulfone (3,3'-DDS), bis-(4-(4-aminophenoxy)phenyl sulfone (BAPS) and 9,9-bis(4-aminophenyl) fluorene (FDA);

with the proviso that if X is O, then Y is not m-

phenylenediamine (MPD), bis-(4-(4-aminophenoxy)phenyl sulfone (BAPS),  
5 and 3,4'-diaminodiphenyl ether (3,4'-ODA);

with the proviso that if X is S(O)<sub>2</sub>, then Y is not 3,3'-

diaminodiphenyl sulfone (3,3'-DDS);

with the proviso that if X is C(CF<sub>3</sub>)<sub>2</sub>, then Y is not m-

phenylenediamine (MPD), bis-(4-(4-aminophenoxy)phenyl sulfone (BAPS),  
10 9,9-bis(4-aminophenyl) fluorene (FDA), and 3,3'-diaminodiphenyl sulfone  
(3,3'-DDS);

wherein the polyimide has a glass transition temperature  
greater than 250°C and wherein the polyimide has a water absorption  
factor of 2% or less.

15 15. A polyimide according to Claim 14 wherein the polyimide has a  
glass transition temperature greater than 290°C and has a water  
absorption factor of 1% or less.

16. A polyimide according to Claim 14 wherein the polyimide has a  
positive moisture solubility measurement.

20 17. A polyimide according to Claim 14 wherein the polyimide is  
used in wafer-level packaging as semiconductor stress buffers,  
interconnect dielectrics, protective overcoats, bond pad redistributors, or  
solder bump under fills.

25 18. A polyimide according to Claim 14 wherein the polyimide is  
used as a polymer binder in a polymer thick film (PTF) resistor, a discrete  
capacitor, a planar capacitor, an encapsulant, or a conductive adhesive.